



Range extension for the Costa Rican Blindsnake, *Amerotyphlops costaricensis* (Jiménez & Savage, 1962) (Serpentes, Typhlopidae)

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Abstract

We present new information on the distribution of a rare species of an American typhlopoid blind snake, *Amerotyphlops costaricensis* (Jiménez & Savage, 1962). Our findings extend the known distribution of this species almost 120 km southeast. The few existing records of this species suggest that research should focus on filling the gaps in the distribution and our knowledge on the ecology of the species and the blind snake group.

Keywords

Distribution, fossorial snakes, scolecophidians, urban ecology.

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Introduction

Globally, the family Typhlopidae contains 274 fossorial snake species (Uetz et al. 2020), the majority of which occur in tropical and subtropical areas (Hedges et al. 2014). These species are characterized by the absence of teeth in the lower jaw, eyes covered by an ocular scale, and head undifferentiated from the rest of the body (Savage 2002). In a recent taxonomic evaluation of this family, American typhlopids were assigned to the Typhlopinae subfamily, and the species distributed from Mexico to Argentina and on some western Antillean islands transferred to the genus *Amerotyphlops* Hedges, Marion, Lipp, Marin & Vidal, 2014 (Hedges et al. 2014).

Amerotyphlops costaricensis (Jiménez & Savage, 1962) is the only species of the genus found in Costa Rica, and its distribution also spans Nicaragua and Honduras (Solórzano 2004). In Costa Rica, it occupies the

premontane area in the northwestern region of the country, from 500 to 1,600 m a.s.l., between the Cordillera de Tilarán and the Cordillera Volcánica Central (Solórzano 2004). Due to its small size (less than 40 cm total length), black dorsal color, and fossorial habits, *A. costaricensis* is difficult to observe in the field and considered a rare species (Leenders 2019). There are fewer than ten individuals deposited in museum collections (Jiménez and Savage 1962; Villa 1978; Wilson et al. 1988; Savage 2002; Köhler 2008; Townsend et al. 2008), representing roughly one population in both Nicaragua and Costa Rica, and three in Honduras (Fig. 1A). Recently, we found two specimens of *A. costaricensis* in Costa Rica (Fig. 1) that to date represent the southernmost localities of the species, extending its distribution to a new mountain range.

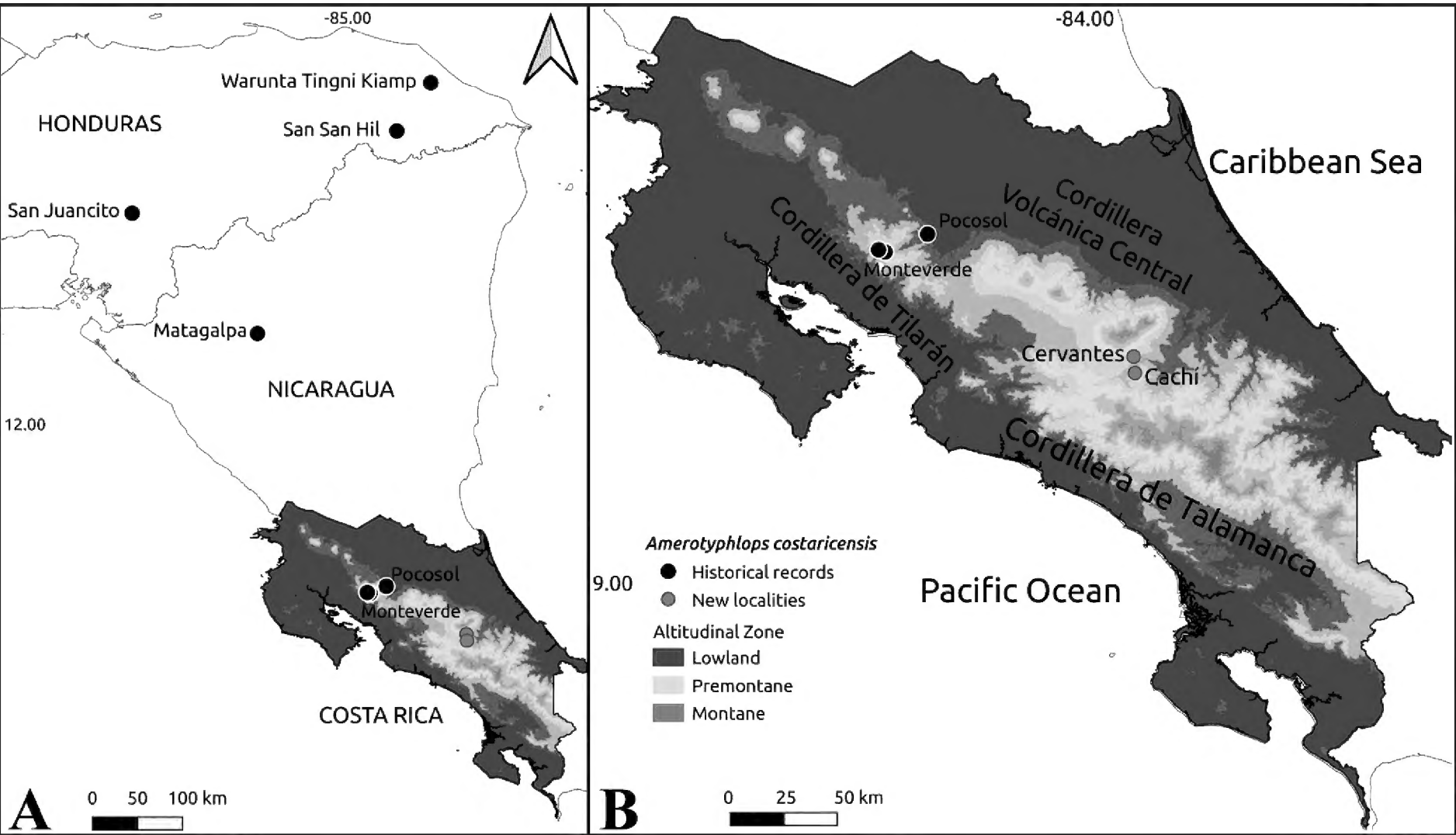


Figure 1. Published locality records of *Amerotyphlops costaricensis*. **A.** Historically recorded localities in Central America. **B.** New records for the species in Costa Rica, their relationship with the main mountain systems, and with the other historical localities in the country (Table 1).

Methods

We found the new specimens in the surroundings of the towns of Cervantes, Cantón Alvarado, and Cachí, Cantón Paraíso, both of which are located in the province of Cartago, Costa Rica (Fig. 1). We euthanized them with Lidocaine, fixed them in 10% buffered formaldehyde, and stored them in 70% ethanol in the Museo de Zoología at the Universidad de Costa Rica (UCR). All collecting was done under the permits of the National System of Conservation Areas (SINAC-SE-CUSBSE-PI-R-131-2016 and SINAC-ACC-PI-R-039-2019). We followed Savage (2002) for morphological identification.

Results

Amerotyphlops costaricensis (Jiménez & Savage, 1962)

New records. COSTA RICA • 1 juvenile, 239 mm TL; Cartago Province, Cantón Alvarado, Cervantes; 09°53.18' N, 083°48.58'W; 1,500 m a.s.l.; 23 March 2016; S. Grados-Martínez col.; UCR 22839. • 1 juvenile, 239 mm TL;

Cartago Province, Cantón Paraíso, Cachí; 09°49.93'N, 083°48.32'W, 1,016 m a.s.l.; 24 March 2020; G. Chaves col.; UCR 23379.

We found two individuals of *A. costaricensis* (<https://doi.org/10.15468/qtzt46>; Fig. 2). SGM's mother found one specimen (Fig. 2A) while it was crossing a street in front of her house. The specimen collected by GC (Fig. 2B) was found dead on the sidewalk of his house, where a domestic cat left it dead. The specimen was captured by the cat in a nearby coffee plantation. In both cases, we searched the area for more specimens without success.

Identification. Our specimens are clearly assignable to *A. costaricensis* because they exhibit the following diagnostic characters (Fig. 2C): fusion of the prefrontal scales with the supranasals, a single preocular scale, and the absence of subocular scales. The body of *A. costaricensis* is dark brown with the head mostly lighter, while other species have a cream-colored body (*Anomalepis mexicanus* Jan, 1860) or head (*Epictia ater* Taylor, 1940), or the head and first body scales unpigmented and the rest of the body black (*Helminthophis frontalis* (Peters, 1860)).

Table 1. Historical records of *Amerotyphlops costaricensis* mapped in Figure 1.

Country	Province	City	Locality	Latitude	Longitude	Collection	Catalogue no.
Costa Rica	Puntarenas	Matas Pasture	Monteverde	10.29720	−084.78330	Museo de Zoología UCR	UCR 5229
Costa Rica	Puntarenas	Monteverde	Monteverde	10.30560	−084.80830	Museo de Zoología UCR	UCR 2215, UCR 4362
Costa Rica	Alajuela	San Carlos	Pocosol	10.36670	−084.61670	Natural History Museum of Los Angeles County	LACM154196
Honduras	Francisco Morazán	Tegucigalpa	San Juancito	14.12000	−087.17000	National Museum of Natural History, Smithsonian Institution	NMNH 564063
Honduras	Gracias a Dios	Aurata	Warunta Tingni Kiamp River	15.42999	−084.16937	Florida Museum of Natural History	UF 142609
Honduras	Gracias a Dios	Santa Isabel	San San Hil	14.94682	−084.51192	United States National Museum of Natural History	USNM 563344
Nicaragua	Matagalpa	Matagalpa	San José de la Montaña	12.90905	−085.91165	American Museum of Natural History	AMNH 113546

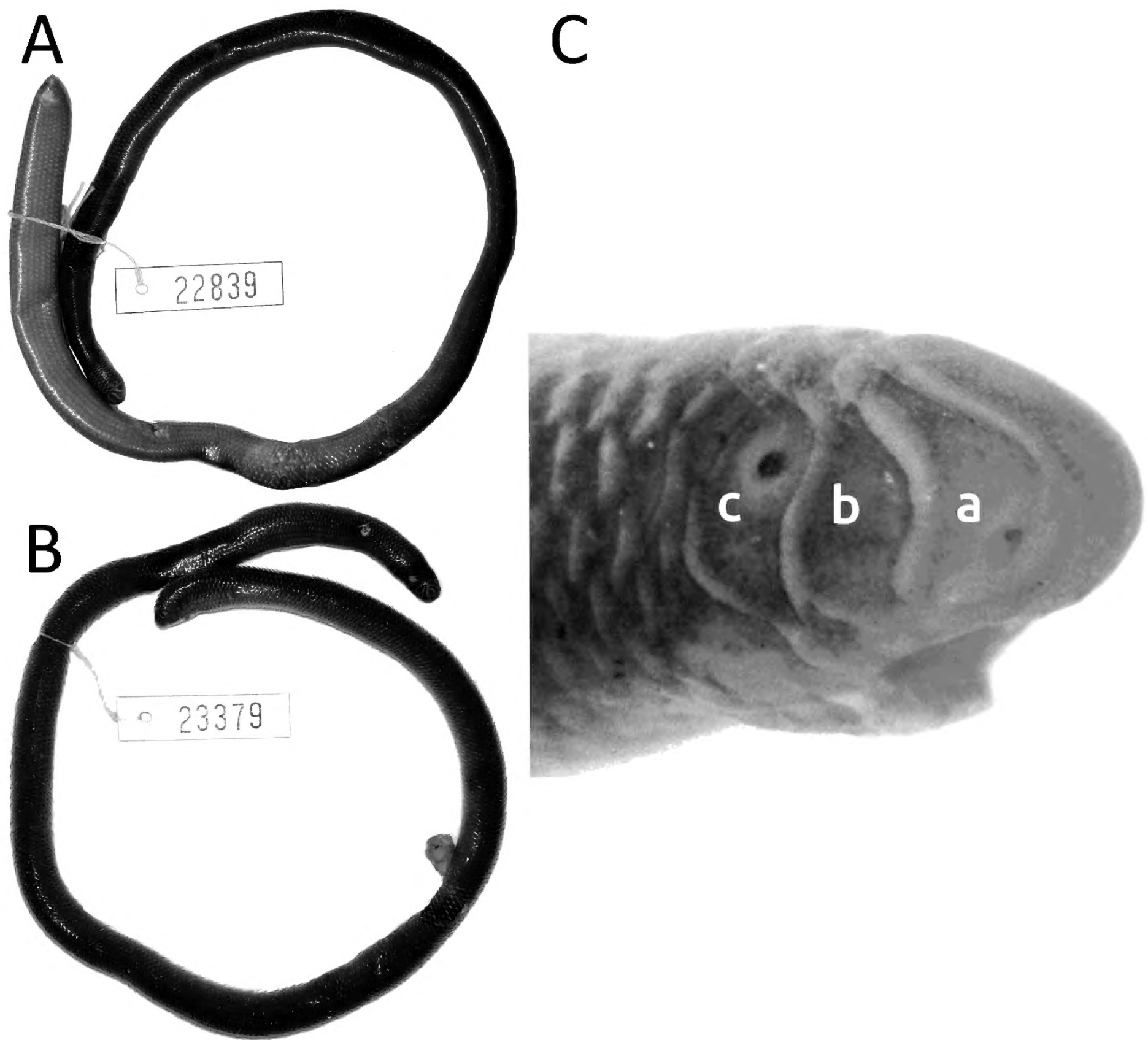


Figure 2. New specimens of *Amerotyphlops costaricensis*. **A.** Juvenile UCR 22839 from Cervantes, Cantón Alvarado, Cartago Province. **B.** Juvenile UCR 23379 from Cachí, Cantón Paraíso, Cartago Province. **C.** Diagnostic characters of *A. costaricensis* as exhibited by UCR 22839: a) Fusion of prefrontal with supranasal scale. b) Pre-ocular scale present. c) Subocular scale absent.

Discussion

Monteverde, Costa Rica, is the type locality and has long marked the southern extreme in the documented distribution of *A. costaricensis* (Jiménez and Savage 1962). Here we present a range extension for this species of nearly 120 km southeast of this locality. Most reported localities for this species are separated from each other by hundreds of kilometers, which highlights the scarcity of information about its distribution.

Amerotyphlops costaricensis is found mainly in rural areas. In Costa Rica, the two previously known localities (Monteverde and Pocosol) are in a rural premontane area in the northwestern region of the country (Jiménez and Savage 1962; Villa 1988; Solórzano 2004). As these localities are separated only by 22 km and from the same mountainous system, we consider them to represent a single population. In Honduras, three populations of *A.*

costaricensis have been reported from rural areas in the subtropical moist pine forest (Wilson et al. 1988) and in the mesic lowlands of Departamento de Gracias a Dios (Townsend et al. 2008). Of the new localities reported herein, one is also a rural area, but the other is an urban area. The same is the case for the Nicaraguan population that occurs in Matagalpa city (Villa 1978) and other specimens found along the road in Honduras (Townsend 2013). For this reason, we suggest that, like other underground snake species, *A. costaricensis* is largely unaffected by human development on the surface (Savage 2002).

Although the localities that we report here are separated from each other by only eight kilometers, one is in the Cordillera Volcánica Central and the other is on a foothill of the Cordillera de Talamanca (Fig. 1B). Furthermore, since they are separated by one of the largest rivers in the country, we suggest that they belong to different populations. Given that the historical records

are in the Cordillera de Tilarán, the new data expand the distribution of the species to now include all of the main Cordilleras in the country.

In contrast to other blind snakes such as *Epictia ater* and *Helminthophis frontalis* (Solórzano 2004), *A. costarricensis* has been recorded fewer times, which could be an indicator that this species has more marked fossorial habits and, consequently, lower detectability. Another explanation could be the species' activity patterns. Intriguingly, the holotype specimen (Jimenez and Savage 1962), the two reported here collected by GC and SGM, and one in Honduras (Wilson et al. 1988) were collected in March. Also, three more specimens from Costa Rica were collected in April (Catalogue of Museo de Zoología de la Universidad de Costa Rica). Thus, seven of ten specimens reported were found in the hottest months of the dry season (Savage 2002). This could be due to chance but also a reflection of circannual activity patterns, so further studies are needed to confirm it.

We found these new specimens 15 years after the last reported sighting. Such slow progress reflects the lack of research on this group of snakes, in which most knowledge has resulted from chance encounters. Fossorial snakes such as blind snakes spend most of their time crawling underground, under rocks, or covered by other objects, making it difficult to find them (Greene 1997; Pyron and Wallach 2014) and contributing to a poor understanding of the group. Some aspects of fossorial snakes such as distribution, sex ratio, and reproductive biology are known thanks to rare long term studies in captivity and museum collections (e.g., Kamosawa and Ota 1996; Marques and Puerto 1998; How and Shine 1999; Willson and Dorcas 2004; Avila et al. 2006). These gaps in our knowledge impede the resolution of the group's evolutionary relationships, leaving taxonomic aspects still in debate (Vidal et al. 2010; Hedges et al. 2014; Pyron and Wallach 2014). We encourage future research on blind snakes to fill the gaps in our understanding of their ecology, behavior, and phylogeny.

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Authors' Contributions

SGM and GC made observations and collected specimens. GC took pictures and made the map. SGM and GC conceived the study and wrote the manuscript. This is a contribution from the Museo de Zoología, Universidad de Costa Rica.

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